Mr. Peter Hart, Chief Ranger
Cape Cod National Seashore
South Wellfleet, Mass. 02663

Dear Mr. Hart:

Attached is a report on the results of the 1982 browntail moth survey made October 14-15, 1982.

If you have any questions, please do not hesitate to call.

Sincerely,

Parker Snowden
Entomologist

cc. Joe Wadland
Stan Hood
Paul Shaeffer

1982 BROWNTAIL MOTH SURVEY ON CAPE COD NATIONAL SEASHORE SOUTH WELLFLEET, MASS.

BY

PARKER SNOWDEN
ENTOMOLOGIST
FOREST SERVICE, USDA

Introduction:

Browntail moth, Euproctis chrysorrhoea (L), is a defoliator of shrubs, deciduous fruit and shade trees. Prior to 1938, it was a major pest in many areas in New England and parts of New York and New Jersey. Presently the insect is now known to occur on some islands in Casco Bay, Portland, Maine and on Cape Cod, Massachusetts. On the Cape, the infestation has been contained for many years to several localized areas around Pilgrim Lake and Provincetown on Cape Cod National Seashore. However, in 1982 new infestations appeared in the Pilgrim Springs, Salt Meadow, Long Point and other areas on the Park. At the request of the Park Service, a detection survey was made October 14-15, 1982 to determine the intensity of browntail moth population and to predict potential defoliation in 1983.

Survey Team:

Barbara Samora, Resource Management Specialist, National Park Service, USDI
John Portnoy, Research Biologist, National Park Service, USDI
James Ebert, Park Ranger, National Park Service, USDI
Parker Snowden, Entomologist, Forest Service, USDA

Survey Area:

Approximately 1400 acres were surveyed on the Park. These areas included Pilgrim Lake-Spring ~~areas~~-Head of the Meadow Beach areas, Provincetown Lands Road-Airport areas, and Herring Cove Beach areas. Long Point which was severely defoliated in 1982 by browntail moth was not surveyed due to high tide. State land adjacent to the Park were also surveyed (see maps).

Host Plants:

Preferred host plants: Apple, pear, beach plum, oaks, shadbush, beech, willow, blackcherry, Aronia sp., and about seventy other shrubs and trees. Conifers are never attacked.

Survey Methods:

Nine infested areas were surveyed for browntail moth webs (hibernaculums). In each area ten preferred host plants were randomly selected to determine number of webs per area and number of webs per plant (SEE MAPS)

One hundred thirty-five webs were collected from the nine areas. Of the 135 webs collected, 20 were examined using two laboratory procedures.

First method consisted of counting number of live larvae per web from eight webs. Eight webs were selected according to their various sizes;i.e. small, medium and large. One large web, three medium webs, and four small webs were selected AND EXAMINED FOR LARVAE. Criterion used in determining the size of the webs were as follows:

a. small webs- less than 1 inch long and less than 1 inch wide.
b. medium webs- between 1-3 inches long and between 1-1½ inches wide
c. large webs- more than 3 inches long and more than 1½ inches wide

Note: These measurements are arbitrary only and are not be used as standard.

Probing for the larvae in their tough silk-lined chambers which were further protected by an outer tenacious silk hibernaculums was very difficult. The hibernaculums and chambers had to be pulled apart with force by a pair of forceps to locate the live larvae. As a note, browntail moth overwinters as live larvae in their webs.

Second method consisted of counting the total number of larvae per web from twelve webs. These webs were randomly selected and soaked in a 10 percent solution of heated KOH with a pinch of deterrent added to dissolve the webs. After the webs had soaked

in the KOH solution for 4-8 hours, larvae and leaf debris floated to the surface. The larvae were separated from the debris by rinsing both through a coarse and fine mesh screen.* This method was efficient and time saver.

Of the 135 webs collected, only two webs which appeared to have little or no larval activity were examined.

Four webs with green-like hue on their silks were collected from two areas to determine if live larvae would emerge from the webs. These were placed in 2-400 ml plastic rearing containers and incubated at room temperature(70° F.) to emerge live larvae.

Results:

Results of number of webs per area and average number webs per plant were as follows:

No. Area	No. and Name Host Plant	No. Webs Per Area	Av. No. Webs Per Plant
1	9 beach plums 1 beech tree	413	41.3
2	10 beach plums	116	11.6
3	10 beach plums	55	5.5
4	10 beach plums	128	12.8
5	5 beach plums 5 beech trees	295	29.5
6	3 beach plums 1 Aronia sp. 6 red oaks	246	24.6
7	2 beach plums 2 shadbush 6 Aronia sp.	156	15.6
8	10 beach plums	97	9.7
9	7 beach plums 3 beech trees	59	5.9

* Personal communication with Paul Shaeffer, Res. Entomologist. Beneficial Insect Research Lab., Newark, Dela.
PhD Dissertation: Population Ecology of the Browntail Moth in North America, Univ. Maine, 1974

Mean number live larvae per web in eight webs of different sizes was 446. The largest web had 2013 live larvae and the smallest web had 9 live larvae. The largest web was a single one, not a consolidation of several colonies. About 5 percent of the larvae were found dead. No dead larvae were found in any of the small webs.

Mean number larvae per web in twelve webs soaked in KOH was 314. Both live larvae killed by the solution ae well as dead larvae were counted. Statistically, it was not possible to determine the number of live larvae that were killed in the KOH solution.

Since the number of webs examined in method 1 ~~was~~ were too small and bias to be of any significant, the larvae counts were combined with those larval counts in method 2 for a total of twenty webs examined. Therefore, the total number of larvae per web in twenty webs was 367. Since ~~twenty~~ 15 percent of the larvae are killed by parasites and twenty percent by winter mortality, adjusted number larvae per web was 239. Estimated number larvae per plant were as follows:

No. Area	Mean No. Larvae/ Web	% Killed by Parasites and Winter Mortality	Adjusted No Larvae/ Plant	Mean No. Webs / Plant	Estimated No. Larvae /Plant
1	367	128	239	41.3	9870
2	367	128	239	11.6	2772
3	367	128	239	5.5	1314
4	367	128	239	12.8	3059
5	367	128	239	29.5	7050
6	367	128	239	24.6	5879
7	367	128	239	15.6	3728
8	367	128	239	9.7	2318
9	367	128	239	5.9	1410

An analysis of the above data indicate that if there ~~are~~ were one or two webs per plant (239 to 478 larvae / plant), infestation ~~will~~ would likely be light. Since all nine areas had more than 2 webs per plant, about 850 acres are moderately to severely infested with browntail moth webs in 1982. Therefore, potential defoliation for 1983 will probably be about 1000 acres. Severe defoliation will occur in Areas No. 1, 2, 4,5, 6, 7, and 8 and moderate defoliation in Areas No. 3 and 9.

No larvae were found in the examination of the two webs. This means that 99 percent of the webs collected had active larvae in them.

Over 500 live larvae emerged from the four webs with green-colored silk. The green color was a fungus growth which probably killed some larvae.

One hymemopterous adult parasite emerged from one of the webs. It was tentatively identified as Monodontomerus sp.; Torymidae (Chalcidoidea). The parasite was submitted to Beltsville Identification Laboratory for confirmation. It is a pupal parasite of the browntail moth but it is also known to exhibit hyperparasitic behavorism on other parasites.

Discussion:

Browntail moth is expected to defoliate about 1000 acres in 1983, a substantial increase from 850 acres in 1982 and 80 acres in 1981. However, the same areas will not be defoliated again in 1984 because if most of the foliage is consumed by larvae, the females will not have enough foliage to oviposit her eggs and will seek new areas for oviposition.*

Will the infestation continue to expand to other areas on the Park or on Cape Cod. Unlikely. For many years the browntail moth infestation has been contained in the Truro-Provineetown areas and will likely remain in these two areas for many more years. Probably reasons why are as follows:

1. There are more preferred host shrubs in these two areas for the population to survive than any other areas.

2. Since these shrubs have small leaves, the larvae spin compact webs which protect them from fall rains that dampen the masses of excrements (frass) and cause molding and death of the larvae. The webs spun by larvae on large leaves, such as oaks, beech, and maple, are more open and loose. These webs are more susceptible to rains and winter weather and fungi which kill many larvae.

3. Except to Massachusetts Dept. Environment Management, browntail moth has not been a problem insect or a nuisance pest

until this year. Many of the infested areas have been in remote places on the Park that attracts little or no public attention. When these remote areas become reinfested again with browntail moth, the insect will get little attention again.

The larvae of browntail moth are also known to cause severe skin irritation to human beings because their hairy bodies are equipped with nettling barbed hairs which easily break off on the skin causing a serious rash and itch. This affection spreads very rapid and is very painful and may last for several weeks. Sometimes the affection is so severe and painful that a person can become seriously ill. Even the hairs floating in the air during the larval molting periods can cause skin irritation. If many hairs are breathe into the lungs, a person could have severe complications in breathing. VASELINE or SWEET OIL IS THE BEST REMEDY TO USE TO RELIEVE THE IRRITATION AND RASH.

For your information the larvae generally emerge from their webs from March 18 to April 20 according to whether the season is early or late. The last larval instar is from the middle of May to the middle of June.

In light infestation browntail moth population can be reduced effectively by cutting and burning the webs in the winter or before the middle of March.

Conclusion:

Browntail moth will be a major insect pest on the Park in 1983. Moderate to severe defoliation will likely occur in those areas surveyed.

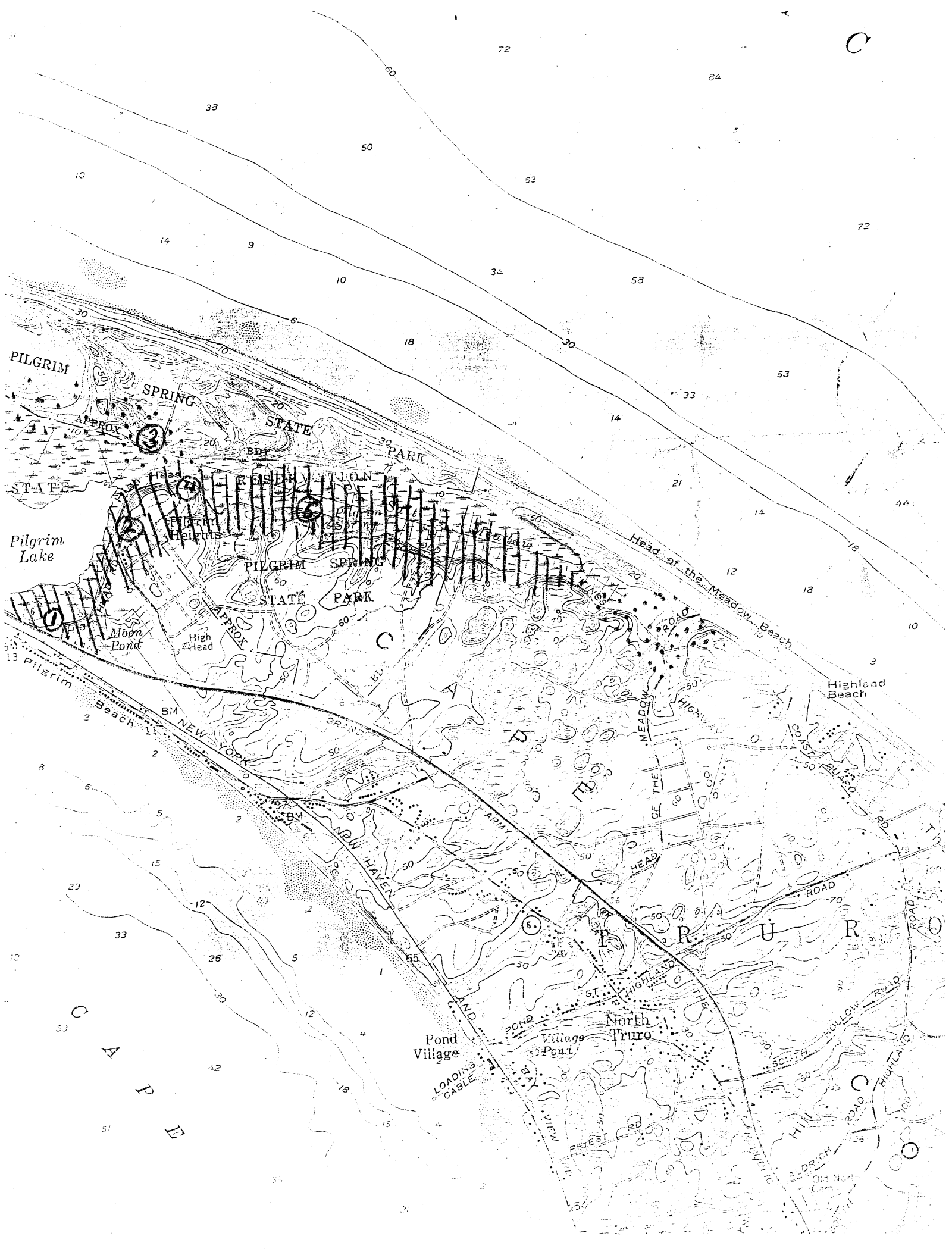
Browntail moth will continue to be a pest of beach plum, shadbush, and other small leaf preferred shrubs unless control measures are taken to reduce the population.

Browntail moth is a health hazard to human beings because the larval hairs cause severe skin irritation and rash.

Reference Cited:

Fernald, C.H. and Kirkland A.H. 1903. The Browntail Moth. Wright and Potter Printing Co. Boston, Mass.

PROVINCETOWN AIRPORT
Ocean View
Point
Race
Point
Lighthouse
Pasture Pond
Bennett Pond
Clam Pond
Duck Pond
Snake Hills
Clam Pond
Province-town Beach
Herring Cove
Shank Painter Pond
Telegraph Hill
BM
ROAD
LAND
GRAND
WINTHROP


PILGRIM
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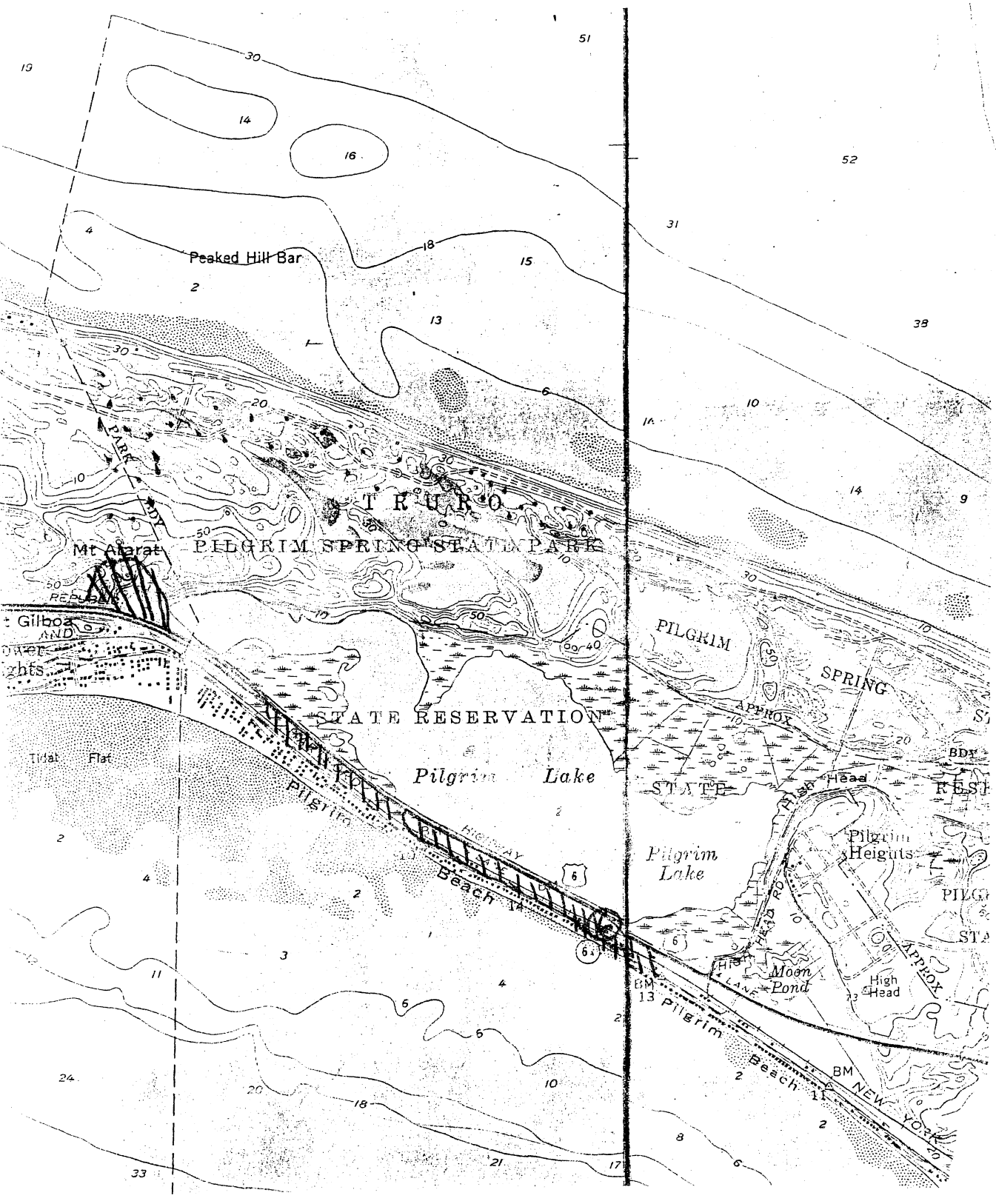
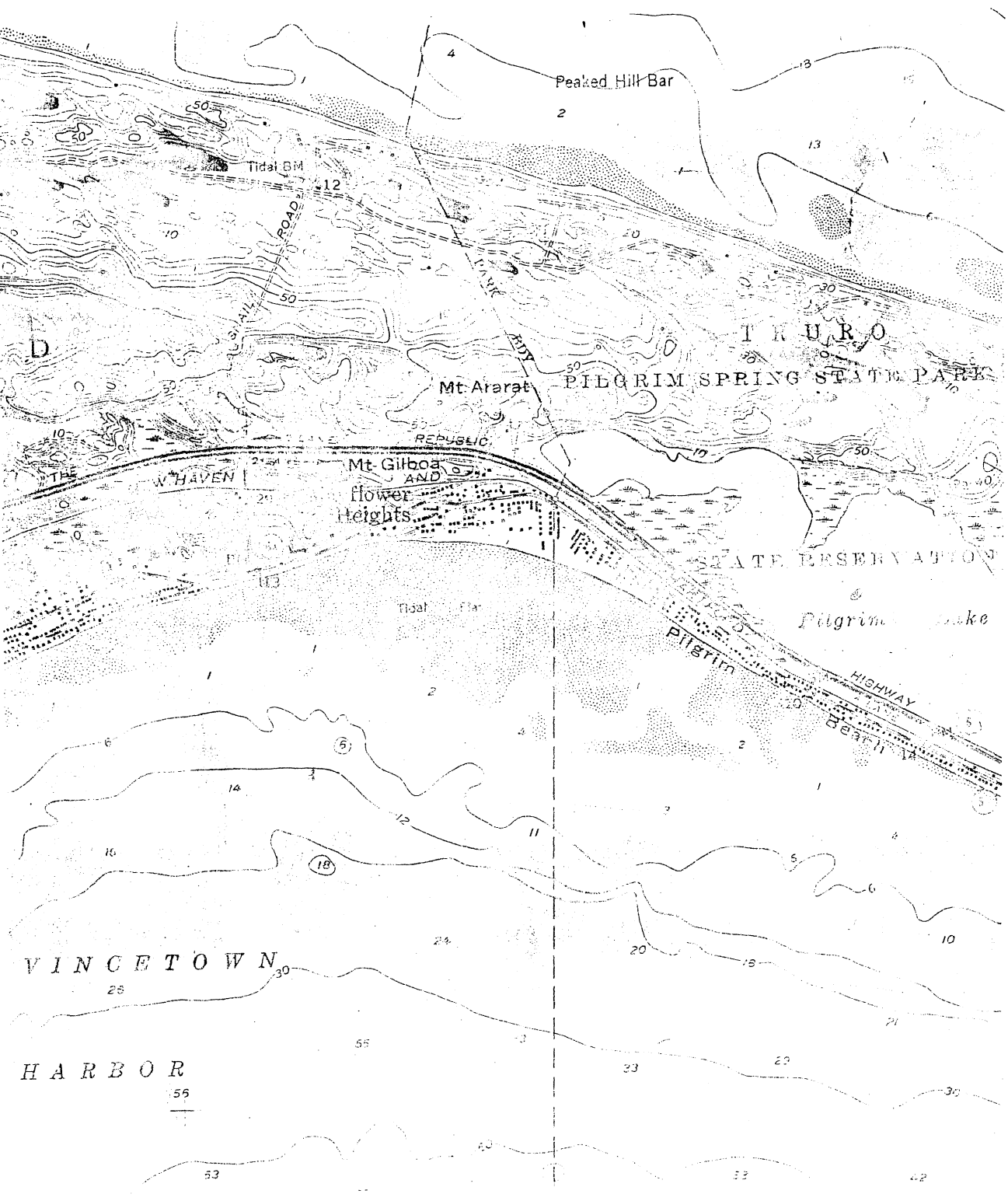
STATE
PARK
APPROX
BDY
Pilgrim Heights
Pilgrim Lake
Moon Pond
High Head
Head of the Meadow Beach
Highland Beach
Pilgrim Beach
BM
NEW YORK
HAVEN
ARM
Pond Village
Pond
North Truro
HIGHLAND
ROAD
MEADOW
HIGHWAY
COAST GUARD
LOADING CABLE
HOLLOW
CAPE
COD
TRURO


Peaked Hill Bar
T R U R O
PILGRIM SPRING STATE PARK
Mt Ararat
STATE RESERVATION
Pilgrim Lake
Pilgrim Lake
Pilgrim Heights
Moon Pond
High Head
Head
Beach 14
Beach 11
BM 13
BM
NEW YORK
Tidal Flat
PARK
RD
APPROX
SPRING
HIGHWAY
LANE


Peaked Hill Bar
Tidal BM
12
ROAD
TRURO
PILGRIM SPRING STATE PARK
Mt Ararat
REPUBLIC
Mt Gilboa
AND
Flower
Heights
THE
WHAVEN
Tidal Flat
Pilgrim Lake
Pilgrim
HIGHWAY
VINCETOWN
HARBOR